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## CLAIMS: I CLAIM

(1) A method for producing ethyne, comprising the steps of

(A) Passing acetaldehyde in the gas phase through a reaction zone containing a dehydrating metal oxide catalyst such as aluminum oxide or magnesium oxide at a temperature of from approximately 250 C to approximately 400 C to remove a molecule of water from the reactant acetaldehyde to produce ethyne and co-product water.

(B) Cooling the resulting gas stream of ethyne, co-product water and unreacted acetaldehyde to a temperature of approximately -50 C to condense the water and acetaldehyde whereby the ethyne is obtained as a gas.

(2) A method for producing substituted ethynes, comprising the steps of

(A) Passing a mono-alpha substituted acetaldehyde, where one hydrogen on the carbon alpha to the aldehyde group is replaced by an aryl or alkyl group which may include up to three additional mono-alpha substituted acetaldehyde moieties, up to a total of ten carbon atoms, including propionaldehyde, succindialdehyde and phenylacetaldehyde through a reaction zone containing a dehydrating metal oxide catalyst such as aluminum oxide or magnesium oxide at a temperature of from approximately 250 C to approximately 400 C to remove a molecule of water from each acetaldehyde moiety in the reactant to produce substituted ethyne and co-product water.

(B) Cooling the resulting gas stream of substituted ethyne, co-product water and unreacted or partially reacted aldehyde and separating the product substituted ethyne from the co-product water and unreacted or partially reacted aldehyde by a physical process such as fractional distillation, fractional crystallization or dessication or a chemical process such as forming an imide or acetal or bisulfite of the aldehyde, or a combination of physical and chemical methods whereby the substituted ethyne is obtained.

(3) A method for producing substituted ethynes, comprising the steps of

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(A) Passing a carbonyl hydrogen substituted acetaldehyde, where the hydrogen of the aldehyde group is replaced by a substituent which is either fluorine or chlorine, an ether linkage or an aryl or alkyl group which may contain up to three additional carbonyl hydrogen or mono-alpha substituted acetaldehyde moieties up to a total of ten carbon atoms, these compounds including acetyl chloride, acetic anhydride, ethyl acetate and acetone through a reaction zone containing a dehydrating metal oxide catalyst such as aluminum oxide or magnesium oxide at a temperature of approximately 250 C to approximately 450 C to remove a molecule of water from each acetaldehyde moiety to produce substituted ethyne and co-product water.

(B) Cooling the resulting gas stream of substituted ethyne, co-product water and unreacted or partially reacted substituted acetaldehyde and separating the product substituted ethyne from the co-product water and unreacted or partially reacted substituted acetaldehyde by a physical process such as fractional distillation, fractional crystallization or desiccation or a chemical process such as forming an imide or acetal or bisulfite of the unreacted or partially reacted substituted acetaldehyde or a combination of physical and chemical methods whereby the substituted ethyne is obtained.

## CERTIFICATE OF SERVICE

I hereby certify a copy of the foregoing was sent by mail this 21<sup>ST</sup> day of FEBRUARY, 2004.

Christian Everett

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Christian Everett